IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	Group Art Unit: 2884
JOHN K. GRADY	)	Examiner: Polyzos, Faye
Serial No.: 10/718,385	)	
Filed: November 19, 2003	)	
For: LOW NOISE X-RAY DETECTOR FOR FLOUROSCOPY	)	

DECLARATION BY APPLICANT JOHN K. GRADY

I, John K. Grady, hereby declare:

1. I am the inventor in this application

2. I have worked in Research and Development at x-ray companies for over 40 years For example, I worked at Picker Corporation (Picker X-Ray), co-founded XRE Corporation, and founded Grady Research.

3. I hold over 25 U.S. patents for x-ray equipment. In those, I am either listed as an inventor or a co-inventor.

4. I am proud to say that x-ray equipment, invented or co-invented by me, has been used in over 5,000 hospitals.

5. First, thank you Examiner Polyzos for taking the time to gain an excellent understanding of our (Grady Research) device. Your comments reflect a level of understanding which is frankly a relief to me.

6. I agree in general with your analysis of our patent claims as originally presented, with response to Ebstein; however, Ebstein's system is designed to operate in a "photon counting mode," where there are "dead times" between the arrival of the individual photons, and the photons are not generally expected to arrive more rapidly than one at a time thus Ebstein is able to quantify the X and Y location of each individual bit for building up an image, and at the same time get an estimate of the energy deposition by his inherent "second channel," which peers into the side of the detector crystal. That is how Ebstein plans to characterize the type of particle arriving, by its deposited energy, as measured by the side mounted photo multiplier. We have none of these things to measure energy or photon count in our device

7. For instance, in "Summary of the Invention," Column 1, Ebstein notes "the PAPA detector determines *the* scintillation positions" in 100 NS. (Note the use of the singular specifying a single event being detected.) In column 5, lines 40-45, he describes count rate can approach 10^7, again counting individual photon hits.

8. Normal x-ray fluoroscopy, by definition, has events happening in all the million pixels simultaneously, with typical photon rate inputs of 10 - 1000 photons per pixel, times 1000 pixels, or about 10^6 events per image, times 30 images per second , two orders of magnitude more photons/sec than Ebstein can handle. Photon counting has not been viable in this imaging mode as there are too many photons at once to separate them in time ---- also there is no need to measure photon energy in fluoroscopy; rather the total energy is summed or integrated in a capacitor associated with each CCD pixel, and that sum is read out about every 30 msec, exactly analogous to television operation of the CCD with a light image.

9. It would seem the disallowance of Claim 1 with respect to Ebstein can be addressed by specifically stating our device does not operate in photon counting mode (as it does not!), and so restrict the claim to normal fluoroscopy wherein all pixels are active at the same time, essentially illuminated in parallel by arriving x-ray photons.

10. While arriving at the correct wording may take some action, the overall detector design we present is entirely different in its intended use and operating mode (inherently) than Ebstein, but both impose similar needs on the coupling optics for the same reason, in order to not miss any events.

11. In particular, all of Ebstein's arrangements use "a second channel," a generally side looking sensor to measure energy (Item 105 in front drawing) (AKA, the second photomultiplier channel he talks about). We simply do not have that at all in our device, as we are not photon counting or quantifying photon energies. The devices functionally are totally different, as is their application field.

12. Thus, I hope an acceptable changing of wording may address your comment?

13. The system of Lee does not use lens optics or light sensitive CCD's at all, but is rather a use of the generic process of avalanche multiplication to overcome the noise of a "flat panel" imager. While this is another attempt to solve the same quantum limited noise issue, our preferred system uses lens couplings, while Lee is analogous to a "contact print" and is devoid of lenses of any kind. By restricting our system in some claims to lens coupling only, I believe that should eliminate any conflict with Lee's device, which has no refracting optical devices in its construction at all.

14. With respect to Stanton, again the system does not use lenses within a critical demagnification range to achieve quantum limited operation, or any lenses at all.

15. In fact, Stanton is not quantum limited, and he makes no such claims. In column 2, lines 55-75, Stanton states that various demagnification ratios are allowable, which is absolutely not the case for quantum limited operation, as the math in our application clearly shows. Stanton uses tapered fiber optics, which we could specifically exclude by limiting our claim set to lenses.

16. The Stanton system is primarily directed at mammography, where 10,000 photons per pixel may be needed to record extremely fine variations in density in the breast, in search of cancerous formations or calcification; this radiation dose per image may be 1000 times as much as each frame of fluoroscopy, which is only acceptable because only a single exposure or two are made as opposed to 30 exposures per second in fluoroscopy. For this reason, non-quantum limited operation has been accepted in mammography.

17. Once again, thank you for taking the time to study and understand a quite specialized device. I am confident you will consider the points raised here as you review our response.

18. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the above-referenced application or any patent issuing thereon.

John K. Grady, P.E.

Date: 4/3/06

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